

JUL 13 2007

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Lowell WINGER

Attorney Docket No.: CISC249/4147

Application No.: 09/874,587

Examiner: Vo, Tung T.

Filed: June 4, 2001

Art Unit: 2621

Title: SOURCE ADAPTIVE SYSTEM AND
METHOD FOR 2D iDCT

Confirmation No.: 5663

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being transmitted by facsimile to fax number 571-273-8300 to the U.S. Patent and Trademark Office on July 13, 2007.

Signed: _____

Michelle Pascual

PRE-APPEAL BRIEF REQUEST FOR REVIEWMail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant requests review of the final rejection dated March 13, 2007 and subsequent Advisory Action dated May 29, 2007 regarding the above-identified application. No amendments are being filed with this request. This request is being filed with a Notice of Appeal. The review is requested for the reasons stated below.

Applicant submits that the rejections are in clear error for at least the reason that the art of record does not teach or suggest selecting a customized subset of inverse discrete cosine transform (iDCT) algorithms for an entire video shot according to the distribution of end of block (EOB) lengths for the DCT blocks within a single selected frame within the video shot. More specifically, the art of record does not teach or suggest selecting a customized subset for an entire video shot. Secondly, the art of record does not teach or suggest that the selection is based upon information from a single selected frame. Thirdly, the art of record does not teach or suggest determining EOB lengths for DCT blocks.

Claims 1, 4, 6, 11-12, 19 and 23-29 were rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Singh et al. (U.S. Patent Application Publication No. 2002/0027954 A1) in view Jun et al. (U.S. Patent No. 7,027,509). Claims 3, 13 and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Singh in view of Jun and further in view of Murata of record. Claims 7-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Singh in

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view of Jun and Murata, and further in view of Youn et al (U.S. Patent No. 6,650,707). Applicant respectfully traverses the rejections.

Claim 1 of the present application describes a method for selecting a customized subset of iDCT algorithms for an entire video shot according to the distribution of EOB lengths obtained for a plurality of DCT blocks from a single selected frame within the video shot. More particularly, the coefficients of a plurality of DCT blocks corresponding to a selected frame within a video shot are examined in order to determine an EOB length for each of the examined DCT blocks. The distribution of EOB lengths of DCT blocks associated with a single selected frame is then examined. Subsequently, a customized subset of iDCT algorithms to be used for the entire video shot is selected from a larger set of iDCT algorithms according to the distribution of EOB lengths for the single selected frame. One of the iDCT algorithms from the customized subset of iDCT algorithms is then selected and executed on each of the plurality of blocks within the video shot according to the associated EOB length of the particular block to be transformed.

Singh, in contrast, discloses a different method of choosing a subset of iDCT algorithms based upon the configuration of zero sub-blocks within a DCT block. More specifically, in the described embodiment, Singh partitions each 8x8 DCT block into four 4x4 sub-blocks (See paragraphs [0029]-[0030]). As presented at page 9 of Amendment H filed June 11, 2007, each DCT block is then grouped into one of eight classes based on the eight possible configurations of zero sub-blocks within the larger block (See paragraph [0031] and the figure between paragraphs [0031] and [0032]). An iDCT algorithm suited to the particular block class associated with the DCT block is then executed on the DCT block. Singh also describes storing in cache memory a limited number of iDCT algorithms corresponding to those block classes which occur with the highest probability (See paragraph [0052]). However, there is no teaching or suggestion in Singh that the limited subset of iDCT algorithms stored in the cache memory are chosen based on a distribution of EOB lengths corresponding to a single selected frame, as required by claim 1. Furthermore, there is no disclosure or suggestion in Singh of selecting and using the chosen limited subset of iDCT algorithms for the entire associated video shot.

As such, Singh fails to teach or suggest several key elements recited in claim 1. Firstly, according to claim 1, the customized subset of iDCT algorithms is chosen for an entire video shot based solely on a distribution of EOB lengths for a single selected frame within the video shot. Notably, as recited at page 17 lines 7-8 of the present specification and presented at page 8 of Amendment H filed June 11, 2007, these elements of claim 1 are based on two properties of typical EOB probability distributions observed by the present inventors. These properties are: 1)

“EOB address probability distributions may vary significantly for different video shots (pg. 17 lines 7-8)”; and 2) “Within a shot and over spans of a few hundred frames EOB histograms often show little significant variance... Therefore, the optimal mix of iDCT routines remains fairly static within an individual shot (pg. 17 lines 21-23).” Furthermore, selecting the customized subset of iDCT algorithms need be, and is, performed only once for each video shot.

In contrast, Singh discloses an embodiment in which the subset of iDCT algorithms is chosen empirically offline: “The probability of occurrence for each of the classes can be estimated off-line by computing statistics using a large number of MPEG2 video source sequences” (See paragraph [0052]). In another embodiment, Singh describes updating the subset at runtime based on updated block statistics (see paragraph [0055]). However, Singh makes no reference to calculating a customized subset for each video shot, let alone choosing the customized subset based on information from a single frame within the associated video shot. Furthermore, Singh makes no reference to the two properties of typical distributions of non-zero coefficients observed by the present Inventors described above.

Secondly, Singh fails to teach the determination of an EOB length. The present invention is not concerned with runs or stretches of zeros prior to the last non-zero coefficient. Instead, the present invention requires only the EOB lengths from each examined DCT block in order to select the customized subset for the entire video shot. As recited at pages 14-15 of the present specification and presented at page 8 of Amendment H filed June 11, 2007, “The EOB marker value indicates that all further coefficients [of the 64 total coefficients] in the block have a value of zero.” In other words, the EOB length (marker) corresponds to the highest DCT coefficient represented in the block, thus, the EOB length can only assume a whole number from 1 to 64. It is respectfully submitted that those of ordinary skill in the art at the time the invention was made would understand the meaning of EOB length as it applies in the context of DCT coefficient blocks, and especially as it is recited in claim 1.

It is acknowledged that Singh discloses the determination of other block statistics involving DCT coefficients such as “the quadrants that contain non-zero coefficients, the rows and columns that contain non-zero coefficients, and the dynamic range within the block” (see paragraph [0006]). However, as described at page 7 of Amendment H, none of these statistics correspond to an EOB length. In particular, an EOB length cannot be directly derived from the zero sub-block classification disclosed by Singh. According to Singh, the DCT blocks are classified according to the locations of sub-blocks within an associated DCT block that contain at least one non-zero DCT coefficient. However, there is no further classification based on the locations of the non-zero coefficients within the sub-blocks, and more importantly, the location

of the last non-zero coefficient in the entire DCT block. Furthermore, Singh fails to teach examining a distribution of EOB lengths of DCT blocks associated with a single selected frame.

In the present Final Office Action, the Examiner asserts that Singh discloses:

A computer program encoded on a computer readable medium containing instructions for selecting inverse discrete cosine transform (IDCT) algorithms, comprising: a) means (12 of fig. 3) for examining the coefficients of a plurality of DCT blocks corresponding to selected frames within a video scene to determine an End of Block (EOB) length for each of the examined DCT blocks ([0029]-[0034], and [0040]-[0043], Note counting the number of elements per column and row), b) means (12 of fig. 3) examining a distribution of EOB lengths associated with a single selected frame selecting frequent EOB length associated with the video frame ([0043]-[0050]; Note determine the probability of occurrence of blocks having particular patterns of sub-blocks with non-zero DCT coefficients); c) means (14 of fig. 3) selecting each a customized subset of IDCT algorithms (16 of fig. 3, Note choosing and storing an optimal IDCT algorithm for blocks having a pattern of non-zero sub-blocks that have a high probability of occurrence, and choosing a default IDCT algorithm for the remaining blocks based upon the probability) for the entire video picture from a plurality larger set of IDCT algorithms (16 of fig. 3, Note prob_3 to prob_i) according to the distribution of EOB lengths for the single selected frame, and d) means ([0052]) selecting and executing one of the customized subset of IDCT algorithms for each of the plurality of blocks within the video frame according to the associated EOB lengths of the blocks executing the selected IDCT algorithm.

Thus, the Examiner asserts that "choosing and storing an optimal IDCT algorithm for blocks having a pattern of non-zero sub-blocks that have a high probability of occurrence, and choosing a default IDCT algorithm for the remaining blocks based upon the probability" suggests "selecting a customized subset of iDCT algorithms for the entire video shot from a larger set of iDCT algorithms according to the distribution of EOB lengths for the single selected frame," as specifically required by claim 1. Again, nowhere does Singh disclose or suggest the use of information (the distribution of EOB lengths) from a single frame to select a customized subset of iDCT algorithms for an entire video shot. In fact, no reference at all to a video shot was found in the disclosure of Singh. On page 4 of the present Final Office Action, the Examiner affirms that, "Singh does not particularly teach the computer processor for examining the coefficients of a plurality of DCT blocks corresponding to selected frames within a video shot." The Examiner further states that, "It would have been obvious to one skilled in the art to incorporate the teaching of Jun into the computer program, method and system of Singh in order to improve the processing speed in the shot change point detection by the color histogram." However, the Applicant is unclear as to how the Examiner has combined the teachings of Jun and Singh. Furthermore, the description of the Examiner's motivation for combining the teachings of Jun and Singh is confusing and appears to have no relevance in the context of the

claimed invention. Specifically, the Applicant is uncertain how a "shot change point detection method" relates to the present invention. At first glance, it appears that Jun was used to broadly teach a video shot. However, the Examiner has not provided any grounds of motivation to combine the two references nor has the Examiner presented a logical combination of the teachings that is suitable to reconstruct the present invention as defined in claim 1. Regardless, it is clear that no reasonable combination of Jun and Singh teaches or suggests "selecting a customized subset of iDCT algorithms for the entire video shot from a larger set of iDCT algorithms according to the distribution of EOB lengths for the single selected frame," as specifically required by claim 1.

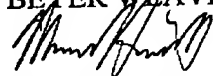
Furthermore, the Examiner asserts that "counting the number of elements per column and row" of a DCT block suggests determining an EOB length for a DCT block, as required by claim 1. Firstly, Applicant could not find a reference to counting the number of elements per column and row" in the paragraphs cited by the Examiner ([0029]-[0034] and [0040]-[0043]). Applicant does note that the only reference to a "count" in the cited paragraphs is described within paragraphs [0042]-[0050], which describe the use of a "row major count system" to determine the class of an associated DCT block based on the location of sub-blocks having at least one non-zero coefficient within the associated DCT block. Hence, Singh does not disclose or suggest the determination of EOB lengths, let alone, examining a distribution of EOB lengths associated with a single selected frame.

Independent claims 4, 6 and 11 contain limitations similar to those described above with respect to claim 1. As such, Applicant respectfully submits that these claims are allowable for at least similar reasons as those described above with respect to claim 1.

Dependent claims 3, 7-10, 12-13, 19 and 22-29 each depend either directly or indirectly from one of the independent claims described above, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to the independent claims.

Withdrawal of the rejections under 35 USC §103(a) is therefore respectfully requested.

Respectfully submitted,
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